

## CLAIMS

1. An integrated multi-chip connector module comprising:

5 an array of substrate assemblies, wherein each substrate assembly comprises:  
a substrate;

one or more integrated circuits attached to the substrate;

10 a set of input connector pins, each input connector pin further comprising a first end and a second end, wherein the first end is provided to receive an incoming signal, and the second end is electrically connected to the one or more integrated circuits on the substrate; and

15 a set of output connector pins, each output connector pin further comprising a first and a second end, wherein the first end is electrically connected to the one or more integrated circuits, and the second end is provided for transmitting a processed signal from the one or more integrated circuits as an output signal to the second end of each output connector pin; and

20 a connector housing for encasing the array of substrate assemblies, wherein the housing comprises a first set of signal pin apertures through which extend the set of input connector pins to allow external electrical connection to a first external device, and wherein the housing further comprises a second set of signal pin apertures through which extend the set of output connector pins to allow external electrical connection to a second external device.

25  
30 2. The integrated multi-chip connector module of Claim 1 wherein each substrate assembly further comprises a set of pin anchoring means, the set of pin anchoring means anchors the input or output connector pins to the substrate assembly.

3. The integrated multi-chip connector module of Claim 1 wherein the second end of each input or output connector pin terminates in an electrically conductive pad.

4. The integrated multi-chip connector module of Claim 1 wherein the second end of each input or output connector pin terminates in an electrically conductive cusp.

5  
5. The integrated multi-chip connector module of Claim 1 wherein the one or more integrated circuits process a set of input signals in a first pinout orientation and redistribute a corresponding set of output signals in a second pinout orientation.

10  
6. The integrated multi-chip connector module of Claim 1 wherein the one or more integrated circuits receive a first set of data signals at a first electrical voltage level and generate in response a set of output signals comprising the first set of data signals at a second electrical voltage level.

15  
7. The integrated multi-chip connector module of Claim 1 wherein the set of output connector pins are provided to electrically couple to a backplane.

8. The integrated multi-chip connector module of Claim 1 wherein the set of input connector pins are electrically coupled to an external line card.

20  
9. An integrated multi-chip connector module comprising:

25  
a set of substrate assemblies, wherein each substrate frames comprises a substrate frame, the substrate frame comprising:

one or more integrated circuits;

30  
a set of input connector pins for receiving a set of input signals at a first end and electrically connected to the one or more integrated circuits at a second end; and

a set of output connector pins, wherein a first end of each output connector pin is electrically connected to the one or more integrated circuits for transmitting processed signals from the one or more integrated circuits;

5

wherein the one or more integrated circuits process the set of input signals in a first pinout orientation and redistribute the set of output signals in a second pinout orientation; and

10 a connector housing having a first set of pin apertures for the set of input connector pins and a second set of pin apertures for the set of output connector pins.

10. An integrated multi-chip connector module assembly method comprising:

15 assembling one or more integrated circuits on a substrate frame;

attaching a plurality of connector pins to each substrate frame and electrically connecting each connector pin to the one or more integrated circuits on each substrate frame to transmit processed signals from the one or more integrated circuits;

20

stacking into an array a plurality of the substrate frames to form an assembly of substrate frames; and

encasing the stacked array of substrate frames in a connector housing.

25

11. The integrated multi-chip connector module assembly method of Claim 9 wherein the step of encasing the stacked array of substrate frames comprises injection molding to form the connector housing.

30

12. The integrated multi-chip connector module assembly method of Claim 9 wherein the step of electrically connecting each connector pin to the one or more integrated circuits on each substrate frames comprises wirebonding.
- 5 13. The integrated multi-chip connector module assembly method of Claim 9 wherein the step of attaching each connector pin to the one or more integrated circuits on each substrate frames comprises a pin anchoring structure to secure the connector pin to the substrate assembly.

10